



Installation Instructions

PLC-5 Ethernet Interface Module

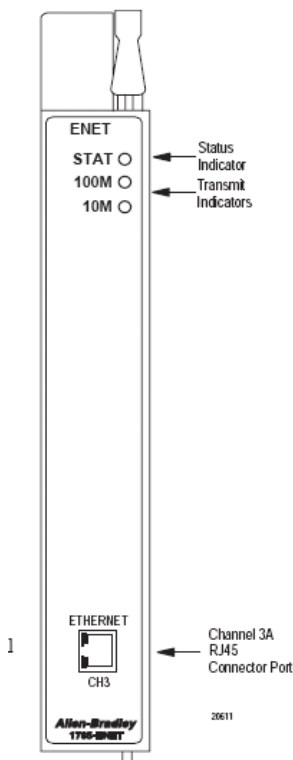
Catalog Number 1785-ENET,
Series C, Revision B

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About This Publication

This publication helps you:

- understand what equipment you need to install the module.
- install and configure the module.
- connect to an Ethernet link and communicate via the module.



Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication SGI-1.1 available from your local Rockwell Automation sales office or online at <http://literature.rockwellautomation.com>) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.





In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

<div>WARNING</div> <div></div>	Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
<div>IMPORTANT</div>	Identifies information that is critical for successful application and understanding of the product.
<div>ATTENTION</div> <div></div>	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you to identify a hazard, avoid a hazard, and recognize the consequences.
<div>SHOCK HAZARD</div> <div></div>	Labels may be located on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
<div>BURN HAZARD</div> <div></div>	Labels may be located on or inside the equipment, for example, a drive or motor, to alert people that surfaces may be dangerous temperatures.

Environment and Enclosure

ATTENTION



This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC publication 60664-1), at altitudes up to 2000 m (6561 ft) without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.

This equipment is supplied as open-type equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The enclosure must have suitable flame-retardant properties to prevent or minimize the spread of flame, complying with a flame spread rating of 5VA, V2, V1, V0 (or equivalent) if non-metallic. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

Besides this publication, see:

- Industrial Automation Wiring and Grounding Guidelines, for additional installation requirements, Allen-Bradley publication 1770-4.1.
 - NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure.
-

Prevent Electrostatic Discharge



ATTENTION



This equipment is sensitive to electrostatic discharge that can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
 - Wear an approved grounding wrist strap.
 - Do not touch connectors or pins on component boards.
 - Do not touch circuit components inside the equipment.
 - Use a static-safe workstation, if available.
 - Store the equipment in appropriate static-safe packaging when not in use.
-

North American Hazardous Location Approval

The following information applies when operating this equipment in hazardous locations	Informations sur l'utilisation de cet équipement en environnements dangereux
<p>Products marked CL I, DIV 2, GP A, B, C, D are suitable for use in Class I Division 2 Groups A, B, C, D, Hazardous Locations and nonhazardous locations only. Each product is supplied with markings on the rating nameplate indicating the hazardous location temperature code. When combining products within a system, the most adverse temperature code (lowest "T" number) may be used to help determine the overall temperature code of the system. Combinations of equipment in your system are subject to investigation by the local Authority Having Jurisdiction at the time of installation.</p>	<p>Les produits marqués CL I, DIV 2, GP A, B, C, D ne conviennent qu'à une utilisation en environnements de Classe I Division 2 Groupes A, B, C, D dangereux et non dangereux. Chaque produit est livré avec des marquages sur sa plaque d'identification qui indiquent le code de température pour les environnements dangereux. Lorsque plusieurs produits sont combinés dans un système, le code de température le plus défavorable (code de température le plus faible) peut être utilisé pour déterminer le code de température global du système. Les combinaisons d'équipements dans le système sont sujettes à inspection par les autorités locales qualifiées au moment de l'installation.</p>
<div data-bbox="96 621 237 683"> WARNING  </div> <div data-bbox="237 621 538 1133"> <p>EXPLOSION HAZARD -</p> <ul style="list-style-type: none"> • Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous. • Do not disconnect connections to this equipment unless power has been removed or the area is known to be nonhazardous. Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product. • Substitution of components may impair suitability for Class I, Division 2. • If this product contains batteries, they must only be changed in an area known to be nonhazardous. </div>	<div data-bbox="538 621 678 683"> AVERTISSEMENT  </div> <div data-bbox="678 621 966 1133"> <p>RISQUE D'EXPLOSION –</p> <ul style="list-style-type: none"> • Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement. • Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher les connecteurs. Fixer tous les connecteurs externes reliés à cet équipement à l'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens fournis avec ce produit. • La substitution de composants peut rendre cet équipement inadapté à une utilisation en environnement de Classe 1, Division 2. • S'assurer que l'environnement est classé non dangereux avant de changer les piles. </div>

European Hazardous Location Approval

European Zone 2 Certification (The following applies when the product bears the EEx marking.)

This equipment is intended for use in potentially explosive atmospheres as defined by European Union Directive 94/9/EC.

The LCIE (Laboratoire Central des Industries Electriques) certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of Category 3 equipment intended for use in potentially explosive atmospheres, given in Annex II to this Directive.

Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN 60079-15.

IMPORTANT

This equipment is not resistant to sunlight or other sources of UV radiation.

Equipment must be installed in an enclosure providing at least IP54 protection when applied in Class I, Zone 2 environments.

This equipment shall be used within its specified ratings defined by Allen-Bradley.

This equipment must be used only with ATEX certified backplanes.

About the Module

The PLC-5 Ethernet interface module is an EtherNet/IP-compliant, single-slot module that attaches to the side of any PLC-5 controller, series B or later, to provide Ethernet connectivity to the controller.

Module Functionality

When used with	The module provides
Enhanced PLC-5 controller	Ethernet connectivity without sacrificing DH+/RIO ports.
ControlNet PLC-5 controller	Ethernet connectivity.
Ethernet PLC-5 controller	ability to operate dual Ethernet links.

Use the module with a programming software package that supports configuration for channel 3A and the following controllers.

PLC-5 Series/Revision Compatibility

Series	Revision	Controller
E and later	Any	All Enhanced, Ethernet, and ControlNet PLC-5 controllers
D	B	PLC-5/11, PLC-5/20, PLC-5/26, PLC-5/30, PLC-5/40, PLC-5/40L, PLC-5/46, PLC-5/60, PLC-5/60L, PLC-5/80, PLC-5/86
		PLC-5/20E, PLC-5/40E, PLC-5/80E
		PLC-5/20C, PLC-5/40C, PLC-5/80C
C	K	PLC-5/11, PLC-5/20, PLC-5/26, PLC-5/30, PLC-5/40, PLC-5/40L, PLC-5/46, PLC-5/60, PLC-5/60L, PLC-5/80, PLC-5/86
		PLC-5/20E, PLC-5/40E, PLC-5/80E
		PLC-5/20C, PLC-5/40C, PLC-5/80C
B	L	PLC-5/40, PLC-5/40L, PLC-5/46, PLC-5/60, PLC-5/60L
A	L	PLC-5/30
A	K	PLC-5/11, PLC-5/20, PLC-5/26

All ControlNet 1.5 PLC-5 controllers support the module.

Channel 3A Default

The module’s channel 3A default is Autonegotiate 10/100 Mbps half duplex.

Enhancement to Series C, Revision B

The module is capable of managing a sustained Ethernet traffic rate of 45 frames per 10 ms interval. In the rare cases when traffic exceeds that, the module will activate a storm handling mechanism. When this occurs, the module may drop some received frames to prevent it from locking up. The module increments the storm counter once during this interval. Transmission Control Protocol (TCP) frames that were dropped during the storm will be retransmitted by the source. To minimize the chances of storms occurring, use Ethernet switches instead of Ethernet hubs.

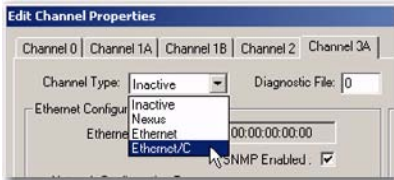
Enhancements to Series C, Revision A

The series C, revision A version of the module’s firmware included these enhancements:

- BOOTP, DHCP, or Static entry of IP address
- Auto-negotiate speed selection
- Full/Half-duplex port setting
- 10/100 Mbps speed selection
- Email client functionality
- Enable/Disable HTTP Web server
- Enable/Disable SNMP functionality

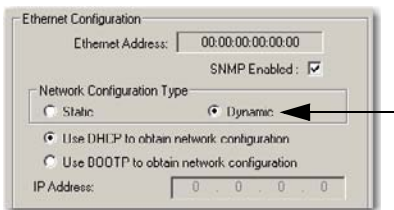
Follow these directions to see or activate the new configuration and status features:

1. Open or create a project in RSLogix 5 software, version 7.1 or later.
2. Click the Channel Configuration menu.
You see the Edit Channel Properties screen.
3. Click the Channel 3A tab.
4. Select Ethernet/C from the Channel Type pull-down menu.



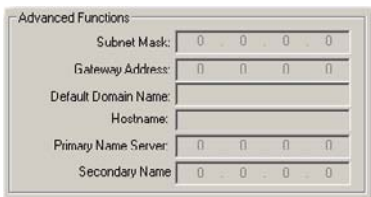
BOOTP, DHCP, or Static Entry of IP Address

As shown in the following dialog, you can select between a static or dynamic network configuration.



- The default is Dynamic Network Configuration Type and Use BOOTP to obtain network configuration.
- If you choose a dynamic network configuration, you can change the default BOOTP to DHCP.
- If you choose a static network configuration type, you must enter the IP address.

Similarly, if you have a dynamic network configuration, DHCP or BOOTP assigns the controller's hostname. With a static configuration, you assign the hostname.



When you create a hostname, consider these naming conventions.

- The hostname can be a text string up to 24 characters.
- The hostname can contain alphanumeric (A through Z, 0...9) and may contain a period and minus sign.
- The first character must be an alpha character.
- The last character must not be a minus sign.
- You cannot use blank spaces or space characters.
- The hostname is not case-sensitive.

Auto Negotiate Speed and Duplex Selection

In the Edit Channel 3A properties dialog, you can either leave the Auto Negotiate checkbox checked, which lets the controller negotiate a speed and duplex port setting, or you can uncheck the Auto Negotiate checkbox, which forces the port setting to a particular speed and duplex port setting.

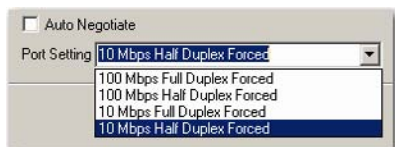
If you uncheck the Auto Negotiate checkbox, the port setting lets you select the range of speed and duplex settings that the controller negotiates. The default port setting with Auto Negotiate checked is 10/100 Mbps half duplex, which lets the controller negotiate any of its four available settings.

The following table lists the order the controller negotiates for each setting.

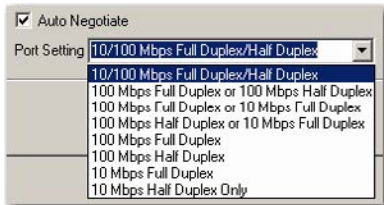
Set Negotiation Order

Setting	100 Mbps Full Duplex	100 Mbps Half Duplex	10 Mbps Full Duplex	10 Mbps Half Duplex
10/100 Mbps Full Duplex/Half Duplex	1st	2nd	3rd	4th
100 Mbps Full Duplex or 100 Mbps Half Duplex	1st	2nd		3rd
100 Mbps Full Duplex or 10 Mbps Full Duplex	1st		2nd	3rd
100 Mbps Half Duplex or 10 Mbps Full Duplex		1st	2nd	3rd
100 Mbps Full Duplex	1st			2nd
100 Mbps Half Duplex		1st		2nd
10 Mbps Full Duplex			1st	2nd
10 Mbps Half Duplex Only				1st

Unchecked Autonegotiate Checkbox and Corresponding Port Settings



Checked Autonegotiate Checkbox and Corresponding Port Settings

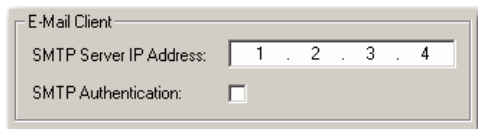


Email Client Functionality

The controller is an email client that sends an email triggered by a message instruction via a mail relay server. The controller uses standard SMTP protocol to forward the email to the relay server. The controller does not receive email.

You must enter the SMTP Server's IP address into the text box as shown in the following dialog.

Enter the SMTP IP Address



The controller supports login authentication. If you want the controller to authenticate to the SMTP server, check the SMTP authentication checkbox. If you select authentication, you must also use a username and password for each email.

Follow these directions to create an email:

1. Create a message instruction similar to the one below.

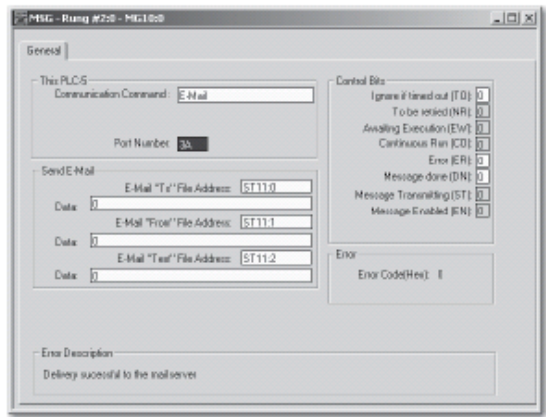


The destination (to), the reply (from), and the body (text) are stored as strings in elements of separate ASCII string files.

If you want to send an email to a specific recipient when a controller application generates an alarm or reaches a certain condition, program the controller to send the message instruction to the destination of the email.

- 2. Verify the rung.
- 3. Click Setup Screen.

A dialog appears like the one below.



The three Data fields display the string values of the ST file element addresses.

- 4. Enter the appropriate information into the Data fields and Username and Password, if Authentication is enabled, to send email.

Examine the Error Code (denoted in Hex) and Error Description areas within the General tab to see if the message was successfully delivered.

Error Code (hex)	Description
0x000	Delivery successful to the mail relay server.
0x002	Resource unavailable. The email object was unable to obtain memory resources to initiate the SMTP session.
0x101	SMTP mail server IP address not configured.
0x102	To (destination) address not configured or invalid.
0x103	From (reply) address not configured or invalid.
0x104	Unable to connect to SMTP mail server.

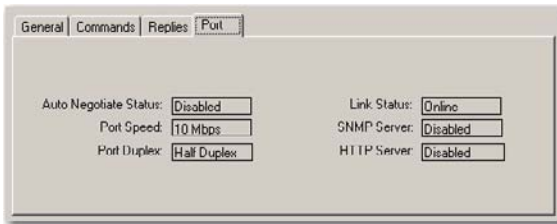
Error Code (hex)	Description
0x105	Communication error with SMTP server.
0x106	Authentication required.
0x017	Authentication failed.

Channel 3A Status

Follow these directions to check the status of channel 3A:

1. Click Channel Status in your RSLogix 5 software project.
You see the Channel Status menu.
2. Click the Channel 3A tab.
3. Click the Port tab.

You see the status for each port configuration.



Enable/Disable HTTP Web Server

You can disable the HTTP Web server functionality from within the Channel 3A Configuration by unchecking the HTTP Server Enable checkbox shown below.



The default (checked box) lets you connect to the controller using a Web browser. Although this parameter can be downloaded to the controller as part of a program download or changed and applied while online with the controller, you must cycle power to the controller for the change to take affect.

Enable/Disable Simple Network Management Protocol (SNMP)

You can disable the controller's SNMP functionality from within the Channel 3A Configuration by unchecking the SNMP Server Enable checkbox.

The default (checked box) lets you connect to the controller using an SNMP client. Although this parameter can be downloaded to the controller as part of a program download or changed and applied while online with the controller, you must cycle power to the controller for the change to take affect.

Series B, Revision D, or Later, Module Features

This release introduced the following features.

Domain Name Service (DNS)

DNS is an enhancement that translates a user-defined name into an Internet Protocol (IP) address.

Web Diagnostics and Module Information

This enhancement is a user-friendly tabularized view of Web diagnostics and module information.

Web User-provided Pages (WUPP)

WUPP lets you create your own custom Web pages to provide executive summaries of process information. The Web pages can contain data table elements, text, and images. These pages are accessible to any Internet user who has network access to the PLC-5 controller.

Web Custom-data Monitor (WCDM)

WCDM is a specialized WUPP that creates a Web page to view these elements in table form.

Internet Scanner Test

Using the Internet Scanner, version 6.21.2001.320, the module passes network-vulnerability tests with the exception of Simple Network Management Protocol (SNMP). While the PLC-5 controller has default SNMP passwords, the controller SNMP information is read-only. If you prefer to limit access to SNMP information, we recommend you configure your network to filter out SNMP requests. For more information, contact Rockwell Automation Technical Support at 440.646.3223.

TCP/IP

The module's TCP/IP communications have been updated for enhanced UDP message support and super-netting

SLC 5/05 Messaging

The module supports SLC Typed Read and Write MSG instructions through the Ethernet interface module to SLC 5/05 controllers

Additional Ethernet-channel Diagnostics

The module includes additional Ethernet-channel diagnostics when using the module with any of the following series/revisions of PLC-5 controllers:

- Series E, Revision E or later
- Series D, Revision F.1 or later
- Series C, Revision P.1 or later
- Series B, Revision P.1 or later

The additional diagnostics are available for use within a user program as words 44...49 of the Ethernet diagnostic file:

Word	Displays
44	Not used
45...47	Ethernet hardware address
48...49	Assigned Internet protocol (IP) address

Words 45...47 contain the six-digit Ethernet hardware address. For example, if the Ethernet hardware address is 00:00:BC:03:00:1D, words 45...47 would contain 000 BC03 001D.

Words 48 and 49 contain 4 bytes of data, with each byte holding one of the numbers of the address, in hex, in the dot-address format. For example, an IP address of 142.169.124.1 will be displayed as 8EA9 7C01.

To access these additional words, you must create the diagnostic file in the channel configuration and manually expand the data table file from 44 to 50 words.

Multihop Messaging Over the Ethernet Network

This lets you communicate over the Ethernet network with ControlLogix devices or through a ControlLogix Ethernet module (1756-ENET) to other PLC-5 and SLC controllers. You need a series E, revision D or later, PLC-5 controller with a series B, or later, 1785-ENET interface module. Keep in mind these considerations:

- RSLogix programming software on ControlNet and DH+ links cannot see the controllers on an Ethernet link.
- The RSLinx DDE server on a ControlNet link cannot poll data from the controllers on an Ethernet link.
- The RSLinx DDE server on a ControlNet link cannot accept unsolicited data from controllers on an Ethernet link.
- Applications that register themselves as nodes on the RSLinx Virtual Link in workstations on the ControlNet network cannot accept unsolicited packets from controllers on the Ethernet network.
- Applications that register themselves as nodes on the RSLinx Virtual Link in workstations on an Ethernet link cannot accept unsolicited packets from the controllers on an Ethernet link.

When an outbound connection's inactivity timer has expired and a MSG is pending on that connection, the MSG receives an error. On a multihop connection, the error is 0x18 (Broken Connection). On a non-multihop connection, the error is 0x16 (Connection Timeout).

For non-multihop connections, the Connection Inactivity Timeout is user configurable. For multihop connections, it is not configurable. Instead, it uses a default timeout value of 17 seconds.

Before You Begin

Follow these directions before installing your module:

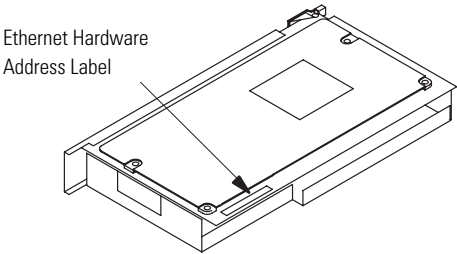
- 1. Check your Ethernet interface module package.
- 2. Make certain that you have the following items:

Quantity	Description
1	1785-ENET Ethernet Interface Module
1	Connector kit containing 1 PLC-5 controller 58-pin connector header
1	Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1
1	PLC-5 Ethernet Interface Module Installation Instructions, publication 1785-IN019

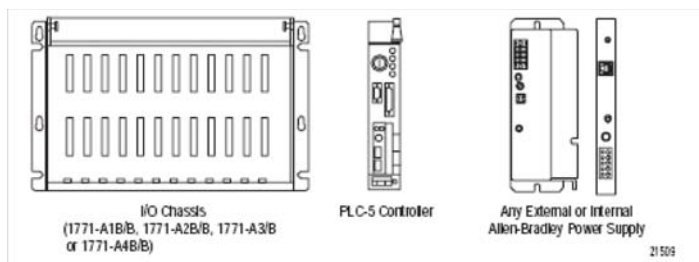
If any items are missing or incorrect, contact your local distributor or Rockwell Automation representative.

- 3. Locate and record the Ethernet hardware address.

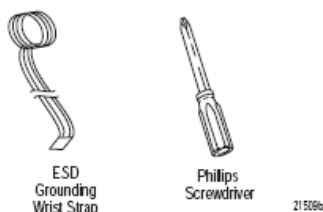
Your module is assigned an Ethernet hardware address at the factory. Look for this address in the back, lower corner of your module, or in the channel 3A configuration dialog in RSLogix 5 programming software.



Parts List



Required Tools



The 1785-ENET is a modular component of the 1771 I/O system requiring a properly installed system chassis. Refer to Universal Chassis I/O Installation Instructions, publication 1771-IN075, for detailed information on an acceptable chassis along with proper installation and grounding requirements. Limit the maximum adjacent slot power dissipation to 10 W.

Install the Module

WARNING



If you connect or disconnect the communications cable with power applied to this module or any device on the network, an electrical arc can occur. This could cause an explosion in hazardous location installations.

Follow these directions to install the module:

1. Attach the connector header to the controller.
2. Connect the module to the controller.

3. Install the combination into the chassis.

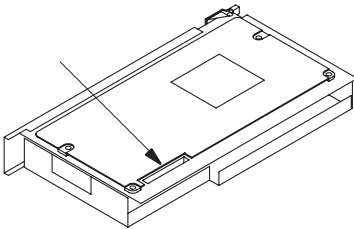
IMPORTANT

If your power supply is already installed in the chassis, be sure the power supply is OFF before you install the module. If you install the module with power ON, you will damage the module.

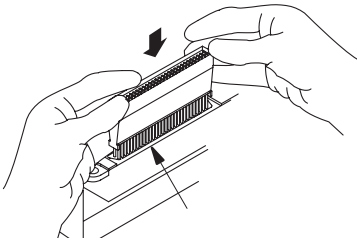
Attach the Connector Header to the Controller

With grounding wrist strap attached to your wrist, follow these steps:

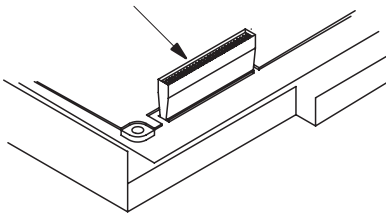
1. Locate the controller's connector header port.



2. Push the exposed pins into the holes on the controller.



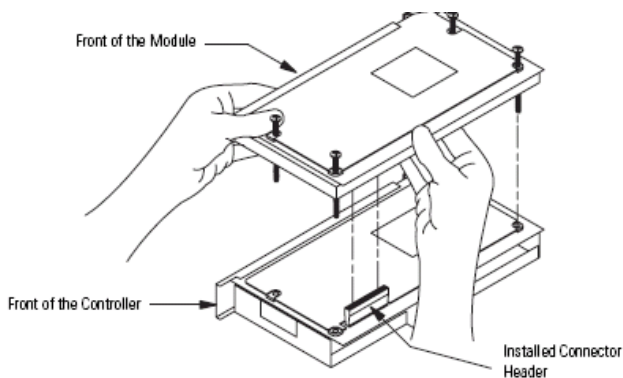
3. Attach the module to the end of the connector header.

**IMPORTANT**

Make certain you carefully align the pins and holes together before you press the connector header into the controller. Improper alignment will bend the connector header pins.

Connect the Module to the Controller

1. Align the pins and holes on the module to those on the connector header.
2. Press the module into the connector header.
3. Tighten the screws.



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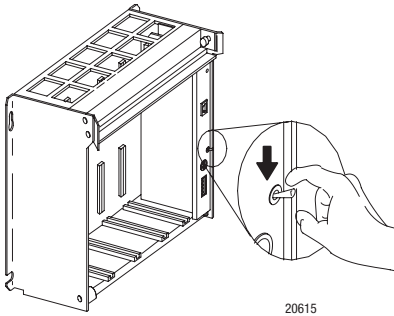
IMPORTANT

Make certain you carefully align the pins and holes together before you press the connector header into the controller. Improper alignment will bend the connector header pins.

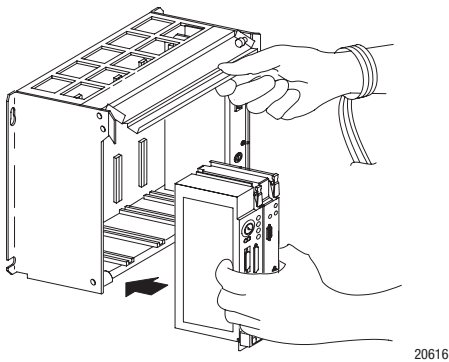
Install the Module Combination into the Chassis

With grounding wrist strap attached to your wrist, follow these steps:

1. Make certain the power to the chassis is OFF.

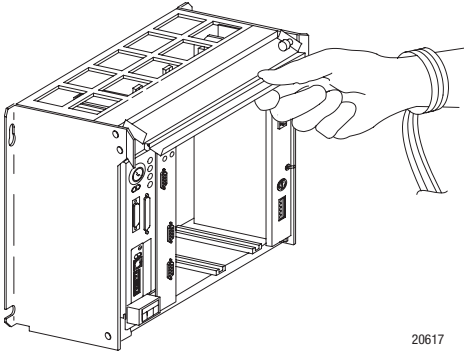


2. Raise the locking bar.



3. Insert the module combination into the leftmost slots of the chassis.

4. Lower the locking bar into place.



Configure the Module for Ethernet Communication

Before configuring channel 3A for Ethernet communication, be sure to:

- know the Ethernet hardware address.
- assign an IP address to the module.

Because the module uses the TCP/IP protocol, each Ethernet hardware address on the network requires a unique IP address.

If the module is connected to	You must assign
an Ethernet PLC-5 controller	two IP addresses: <ul style="list-style-type: none">• one for the controller.• one for the module.
an Enhanced PLC-5 controller	one (1) IP address for the module.
a ControlNet PLC-5 controller	one (1) IP address for the module.

The IP address is software-configurable using either the BOOTP protocol or your programming software package.

Contact your network administrator for a unique IP address to assign to your module.

Configure Channel 3A

Once you obtain the IP address that you will assign to the module, you must configure channel 3A so your network recognizes the module.

Use your programming software package to designate channel 3A as the channel that supports the module if you are configuring **offline** (if you are configuring online, designation is automatic).

IMPORTANT

To configure the module online, it must be attached to the controller.

Specify Ethernet Information

Specify Ethernet information for the interface module by doing one of the following:

- Manually enter module configuration information using the screens within your programming software package.
- Supply module configuration information using a BOOTP utility (use a BOOTP server on your network and edit the BOOTPTAB file).

Manually Enter Module Configuration Information

The default for the Ethernet interface module is BOOTP enabled. You must first disable BOOTP before you can use the programming software to enter module configuration information.

To disable BOOTP and to manually enter module configuration information for channel 3A, follow the steps specified in your programming software documentation.

Enter configuration information in the appropriate fields.

This Field	Specifies	Configure by Doing the Following
Diagnostics file	The file containing the channel's status information	<p>Cursor to the field, type an unused integer file number (10...999), and press Enter. The system creates an integer file 44 words long.</p> <p>Important: Do not assign a diagnostic file number that is the I/O status file you assigned to another communication channel or any other used file. Unpredictable machine action can result.</p> <p>Important: You must define a diagnostics file for a channel configured for anything but unused (even if you are not using the channel) if you want status information for that channel.</p>
Ethernet address	<p>The interface module's Ethernet hardware address</p> <p>Display only</p>	<p>Assigned at factory and cannot be changed.</p> <p>Displayed as a set of 6 bytes (in hex), separated by colons.</p>
IP address	The interface module's Internet address	<p>Cursor to the field, and enter an address in this form:</p> <p>a.b.c.d Where: a, b, c, d are between 1...254 (decimal)</p> <p>You must specify the IP address to have the interface module connect to the TCP/IP network. Do not use 0 or 255 as a, b, c, or d in the IP address.</p>
BOOTP enable	Whether BOOTP is enabled	<p>Cursor to the field and specify No (for manual configuration).</p> <p>Before you disable BOOTP, make sure you have an IP address specified. With BOOTP set to No, the interface module uses the parameters that you specify locally.</p>
MSG conn timeout	The number of ms allowed for an MSG instruction to establish a connection with the destination node	<p>Cursor to the field, and enter a timeout period in ms. (The interface module rounds to the nearest 250 ms.) The valid range for a timeout period is 0...65,535 ms.</p> <p>The default is 15,000 ms.</p>
MSG reply timeout	The number of ms the Ethernet interface waits for a reply to a command it initiated (through an MSG instruction)	<p>Cursor to the field, and enter a timeout period in ms. (The interface module rounds to the nearest 250 ms.) The valid range for a timeout period is 0...65,535 ms.</p> <p>The default is 3,000 ms.</p>

This Field	Specifies	Configure by Doing the Following
Inactivity timeout	The number of minutes of inactivity before the connection is closed	Cursor to the field, and enter a timeout period in minutes. The valid range for a timeout period is 0...65,535 minutes. The default is 30 minutes.
Broadcast address	The broadcast address to which the controller should respond	See the Enhanced and Ethernet PLC-5 Programmable Controllers User Manual, publication 1785-UM012, for information about how to configure these advanced Ethernet functions.
Subnet mask	The controller's subnet mask (used when network has subnets)	
Gateway address	The IP address of the gateway that provides a connection to another IP network	
Link ID	A DH+ link number Use the link ID number to identify the controller when configuring a ControlLogix system using the ControlLogix Gateway software	Enter a link ID number. The valid range is 0...199. Only enter a Link ID number if you plan to configure multihop MSG instructions through a 1756-DHRIO module in a ControlLogix chassis.

After entering the channel 3A configuration information, either accept edits or access status information about channel 3A.

Use BOOTP to Enter Configuration Information

BOOTP is a protocol that supplies the interface module with configuration information when you apply power. BOOTP lets you dynamically assign IP addresses to devices on the Ethernet link.

To use BOOTP, a BOOTP server must exist on the local Ethernet subnet. The server is a computer (either a personal computer, VAX, or UNIX system) that has BOOTP-server software installed and reads a text file containing network information for individual nodes on the network.

To enable BOOTP, follow the steps specified in your programming software documentation to specify Ethernet configuration information.

When BOOTP is enabled, the following events occur when you cycle power:

- The controller broadcasts a BOOTP-request message containing its hardware address over the local network or subnet.
- The BOOTP server compares the hardware address with the addresses in its look-up table in the BOOTPTAB file.
- The BOOTP server sends a message back to the controller with the IP address and other network information that corresponds to the hardware address it received.

With all hardware and IP addresses in one location, you can easily change IP addresses in the BOOTP configuration file if your network needs change.

Edit the BOOTPTAB Configuration File

IMPORTANT

Be certain you know your Ethernet hardware address as you will enter it in this file.

You must edit the BOOTPTAB file, which is an ASCII text file, to include the name, IP address, and hardware address for each Ethernet interface module you want the server to boot. Follow these directions to edit this file:

1. Open the BOOTPTAB file using a text editor.

The file contains lines that look like this:

```
#Default string for each type of Ethernet client
defaults5E: ht=1:vm=rfc1048
```

These are the default parameters for Ethernet PLC-5 interface module and must always precede the client lines in the BOOTPTAB file.

The file also contains a line that looks like this:

```
sidecar: tc=default5E:ip=aa.bb.cc.dd:ha=0000BC03xxyy
```

IMPORTANT

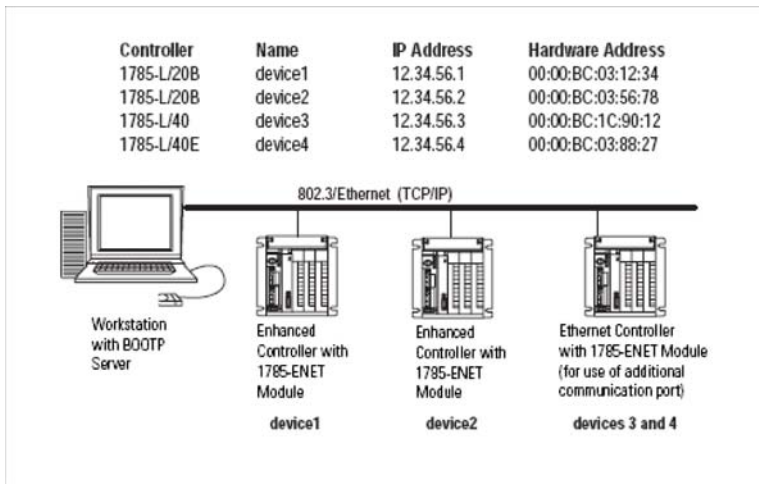
Use this line as the configuration template for Ethernet devices.

2. Make one copy of the Ethernet device template for every PLC-5 Ethernet interface module in your system (one line per module).
3. Edit each copy of the template:
 - a. Replace `sidecar` with the name you assigned the Ethernet interface module. Use only letters and numbers; do not use underscores.
 - b. Replace `aa.bb.cc.dd` with the IP address to be assigned to the interface module.
 - c. Replace `xxyy` with the last four digits of the Ethernet hardware address. Use only valid hexadecimal digits (0...9, A through F); do not use the hyphens or colons that separate the numbers. (You will find the hardware address on a label affixed to the printed circuit board of the module.)
4. Save, close, and make a backup copy of this file.

EXAMPLE

The following system shows three controllers (two enhanced controllers and one Ethernet controller) with attached 1785-ENET interface modules and a workstation with a BOOTP server.

The names and hardware addresses are device specific.



Based on this configuration, the BOOTPTAB file would look like this:

```
#      Legend:      gw -- gateways
#                  ha -- hardware address
#                  ht -- hardware type(1)
#                  ip -- host IP address
#                  sm -- subnet mask
#                  vm -- BOOTP vendor extensions format(2)
#                  tc -- template host

#Default string for each type of Ethernet client
defaults5E: ht=1:vm=rfc1048

#Entries for 1785-ENET modules:
device1: tc=defaults5E:ip=12.34.56.1:ha=0000BC031234
device2: tc=defaults5E:ip=12.34.56.2:ha=0000BC035678
device4: tc=defaults5E:ip=12.34.56.4:ha=0000BC038827

#Entries for Ethernet PLC-5 controllers:
device3: tc=defaults5E:ip=12.34.56.3:ha=0000BC1C9012
```

(1) 1 = 10MB Ethernet

(2) use rfc1048

Run your BOOTP server utility and then cycle power on the chassis that contains the Ethernet interface module. This sends the configuration information to the module.

Apply Power to the Chassis

When you cycle power, the interface module performs the following functions:

- establishes communication with the controller.
- broadcasts BOOTP requests if BOOTP is enabled.

Establish an Ethernet Connection

The module supports 64 simultaneous connections per module. A connection is a unique path to an end device, such as a ControlNet controller on a ControlNet link attached via a 1756-CNB module. Each unique path uses a different connection. There is an exception for a controller on a DH+ link attached via a 1756-DHRIO module. Each 1756-DHRIO module uses only one connection, regardless of how many devices are attached to it and how many paths you define to those devices.

Multiple MSG instructions can use the same path to a device, but only one connection is used because the path is the same.

Monitor Ethernet Status Data

Monitor communication status through the module by accessing the Ethernet Channel 3A status dialog.

Ethernet Status Data

Status Field		Bytes	Displays the Number of
Commands	Sent	0...3	Commands sent by the channel
	Received	4...7	Commands received by the channel
Replies	Sent	8...11	Replies sent by the channel
	Received	12...15	Replies received by the channel
	Sent with error	16...19	Replies containing errors sent by the channel
	Received with error	20...23	Replies containing errors received by the channel
	Timed out	24...27	Replies not received within the specified timeout period
Ethernet	In octets	28...31	Octets received on the channel
	Out octets	32...35	Octets sent on the channel
	In packets	36...39	Packets received on the channel, including broadcast packets
	Out packets	40...43	Packets sent on the channel, including broadcast packets
	Alignment errors	44...47	Frames received on the channel that are not an integral number of octets in length
	FCS errors	48...51	Frames received on the channel that do not pass the FCS check
	Carrier sense errors	52...55	Times that the carrier sense condition was lost or never asserted while trying to transmit a frame
	Excessive collisions	56...59	Frames for which a transmission fails due to excessive collisions
	Excessive deferrals	60...63	Frames for which a transmission is deferred for an excessive period of time
	MAC receive errors	64...67	Frames for which reception on an interface fails due to internal MAC sublayer receive error
	MAC transmit errors	68...71	Frames for which reception on an interface fails due to internal MAC sublayer transmission error
	Single collisions	72...75	Successfully transmitted frames for which transmission was delayed because of collision
	Multiple collisions	76...79	Successfully transmitted frames for which transmission was delayed more than once because of collision
	Deferred transmissions	80...83	Frames for which the first transmission attempt is delayed because the medium is busy
	Late collisions	84...87	Times that a collision is detected later than 512 bit-times into the transmission of a packet

Use the Message Instruction

The message (MSG) instruction transfers up to 1000 elements of data; the size of each element depends on the data table section that you specify and the type of message command that you use. One binary element contains one 16-bit word, for example, and one floating-point element contains two 16-bit words.

The MSG instruction transfers data in packets. Each packet can contain up to 709 words for Ethernet controllers and interface modules. If your message transfer contains more words than fit in one packet, the transfer requires more than one packet of transfer data. The more packets of data to transfer, the longer the total transfer takes.

Enter Parameters

The control block is where all of the information relating to the message is stored. Ethernet message instructions use two consecutive control blocks:

This Block	Contains
First	Message information
Second	Destination address

IMPORTANT

Because Ethernet messages need two consecutive control blocks, the message control block that you specify must start on an even element number.

Use your programming software package to enter the control block address. After entering the control block, the programming terminal automatically displays a data entry dialog, from which you enter instruction parameters that are stored at the control block address.

Parameter Descriptions

This Parameter	Specifies
Command Type	Whether the MSG instruction performs a read or write operation. The software toggles between: PLC-5 Typed Read, PLC-5 Typed Write, PLC-5 Typed Write to SLC, PLC-5 Typed Read from SLC, SLC Typed Logical Read, SLC Typed Logical Write, PLC-2 Unprotected Read, PLC-2 Unprotected Write, PLC-3 Word Range Read, and PLC-3 Word Range Write.
PLC-5 Data Table Address	The data file address of the controller containing the message instruction. If the MSG operation is write, this address is the starting word of the source file. If the MSG operation is read, this address is the starting word of the destination file.
Size in Elements	The number of elements (1...1000) to be transferred.
Destination Address	The starting address of the source or destination file in the target controller.
Port Number	The channel for message communications. Communications through the Ethernet interface module use channel 3A.

When you enter 3A as the port number, an Ethernet instruction entry dialog appears. In addition to the information you entered previously, this dialog includes a field for entering the Host/Internet (IP) address. Enter the IP address of the destination controller here.

The IP address specifies the MSG instruction's destination node. If the destination is:

- a PLC-5/20E, PLC-5/40E, PLC-5/80E, or another 1785-ENET-equipped PLC-5 controller, the destination must be a full IP address.
- an INTERCHANGE client program, type CLIENT in the Destination Node field.

IMPORTANT

You must set the port number to 3A to access this function.

Use ControlLogix Devices for Communication

The Ethernet interface module, series A, revision E or later, with a PLC-5 controller can communicate over the Ethernet network with ControlLogix devices or through a ControlLogix Ethernet (1756-ENET) module to other PLC-5 controllers.

To communicate through a 1756-ENET module, you configure the multihop feature of a MSG instruction from the Ethernet PLC-5 controller (or controller with 1785-ENET module) to the target device. To do this, you need RSLogix 5 programming software.

For more information, see the MSG instruction in the PLC-5 Programmable Controller Instruction Set Reference Manual, publication 1785-6.1.

If you want to go through the ControlLogix 1756-ENET module and out the 1756-DHRIO module to the target device:

- Use RSNetWorx software to configure the 1756-DHRIO module routing table in the ControlLogix system.
- Specify a Link ID number on channel properties for channel 2/3A of the Ethernet PLC-5 controller (or PLC-5 controller with a 1785-ENET module).

For information on specifying the path of the MSG instruction, see the documentation for your programming software.

Interpret Error Codes

When the controller/interface module detects an error during the transfer of message data, the controller sets the .ER bit and enters an error code that you can monitor from your programming software.

Error Codes

Code (Hexadecimal - word 1 of the control block)	Description (displayed on the data monitor screen)
0010	No IP address configured for the network
0011	Already at maximum number of connections
0012	Invalid internet address or host name
0013	No such host
0014	Cannot communicate with the name server
0015	Connection not completed before user-specified timeout
0016	Connection timed out by the network
0017	Connection refused by destination host
0018	Connection was broken
0019	Reply not received before user-specified timeout
001A	No network buffer space available
0037	Message timed out in local controller
0083	Controller is disconnected
0089	Controller's message buffer is full
0092	No response (regardless of station type)
00D3	Control block formatted incorrectly
00D5	Incorrect address for the local data table
0500	Message timed out waiting for a response from a client
1000	Illegal command specified in MSG instruction.
2000	Error communicating with a client
3000	Client session has disconnected
4000	Controller connected but faulted (hardware)
5000	Client generated an error converting data.
6000	Requested function is not available. Client's unsolicited handler returned an error.
7000	Controller is in Program mode
8000	Controller's compatibility file does not exist
9000	Client's backlog has been exceeded
B000	Controller is downloading so it is inaccessible
F001	Controller incorrectly converted the address

Code (Hexadecimal - word 1 of the control block)	Description (displayed on the data monitor screen)
F002	Incomplete address
F003	Incorrect address
F006	Addressed file does not exist in target controller
F007	Destination file is too small for number of words requested
F00A	Target controller cannot put requested information in packets
F00B	Privilege error, access denied
F00C	Requested function is not available
F00D	Request is redundant
F011	Data type requested does not match data available
F012	Incorrect command parameters

Identify the Module Within a Network

The PLC-5 Ethernet Interface Module supports the Simple Network Management Protocol (SNMP).

The module responds automatically to SNMP requests and maintains a management information base (MIB) file (Level II). Information kept in this file could include:

- number of datagrams received.
- number of fragmented packets received.
- maximum number of TCP connections allowed.

Save and Restore Programs

You can physically and logically save and restore all programs, if you are using:

- any release of RSLogix 5 programming software.
- AI Programming Software, release 7.21 or later, for all logical saves/restores.
- 6200 Series Programming Software, release 5.2 or later, for all logical saves/restores.
- an enhanced PLC-5 controller, series B or later.

Domain Name Service

DNS allows an Internet Protocol (IP) address in symbolic form to be converted into the equivalent numeric IP address. For the PLC-5 controller, this conversion is a service provided by a remote host on the network.

With the latest release of the Ethernet PLC-5 controllers and RSLogix programming software, version 5.20 or later, you can enter the symbolic form of the IP address as the IP address in the Message Block.

The Channel Configuration feature in RSLogix5 programming software lets you configure a primary and secondary DNS server, as well as a default domain name (for example, cle.ab.com).

DNS names consist of a label name and a domain name. When programming the message instruction, you can enter the full label and domain name (for example, Motor1.cle.ab.com) or just the label name (Motor1). The default domain name (cle.ab.com) is appended to the label name.

Label names must start with a letter and can only consist of letters, digits, and hyphens.

When a message instruction with a label name is first used, the PLC-5 controller verifies that label name with the name servers. When the IP address is returned, the connection is made. After the connection is made, subsequent message instructions will not require label name verification.

Embedded Web Server

Follow these directions to use the embedded Web server:

1. Go online at your controller's IP address (for example, www.cle.ab.com).

The 1785-ENET Ethernet Module main page appears.

2. Select the first item, Module Information.

The Module Information page appears and displays specific controller information.

3. Select TCP/IP Configuration at the bottom of the Module Information dialog.

The TCP/IP Configuration page appears and displays TCP/IP parameters.

4. Select Diagnostic Information at the bottom of the TCP/IP configuration dialog.

The Diagnostic Information page appears and displays two lists of statistics pages. The first list contains Network Stack Statistics. These pages present information about the TCP/IP stack.

For example, from the Network Stack Statistics list, select the first entry, General Ethernet Counters.

This page displays general messaging statistics. Use the information on this page when troubleshooting the network.

Details of each counter on the General Ethernet Counters page are described in the following table:

This Counter	Totals
Commands Sent	Number of PCCC (programmable controller communication commands) sent by the module
Replies Sent	Number of PCCC replies sent by the module
Command Received	Number of PCCC commands received by the module
Replies Received	Number of PCCC replies received by the module
Replies Sent with Error	Number of PCCC replies with error status sent by the module
Replies Received with Error	Number of PCCC replies with error status received by the module
Replies Timed Out	Number of PCCC replies that were not received within the time period specified on the Ethernet Configuration page
In Octets	Number of octets received by the module
Out Octets	Number of octets sent by the module
In Packets	Number of packets received by the module, including broadcast packets
Out Packets	Number of packets sent by the module, including broadcast packets
Alignment Errors	Count of frames received that are not an integral number of octets in length
FCS Errors	Count of frames that do not pass the FCS check
Carrier Sense Errors	Number of times that the carrier sense condition was lost or never asserted when attempting to transmit a frame
Excessive Collisions	Count of frames when transmission fails caused by excessive collisions
Excessive Deferrals	Count of frames when transmission is deferred for an excessive period of time
MAC Receive Errors	Count of frames when transmission fails because of an internal MAC sublayer receive error
MAC Transmit Errors	Count of frames when transmission fails because of internal MAC sublayer transmit error
Single Collisions	Count of successfully transmitted frames when transmission is inhibited by one collision
Multiple Collisions	Count of successfully transmitted frames when transmission is inhibited by more than one collision
Deferred Transmissions	Count of frames when the first transmission attempt is delayed because the medium is busy
Late Collisions	Number of times that a collision is detected later than 512 bit-times into the transmission of a packet
Packet Storms	Number of times the SONIC driver has entered storm or throttle back operation due to excessive traffic

5. Select Diagnostic Information at the bottom of the General Ethernet Counters dialog to return to that dialog.

The second list contains Application Level Statistics. These pages present information about the Client Server Protocol (CSP) and the Control Information Protocol (CIP), such as:

- Memory usage
- Inbound/outbound connection information
- Packet processing

Details of the first four of these pages are described in the following table:

This Page	Indicates
Application Memory Statistics	information on the number of connections available and the number currently in use for inbound/outbound connections
Dualport Message Statistics	number of Command/Reply packets being processed between the 1785-ENET module and the PLC-5 programmable controller
CSP Session Table	inbound/outbound information for the CSP connection
Encapsulation Protocol Session Table	inbound/outbound connection information for the CIP connections

The remainder of the Application Level Statistics pages present detailed information on CIP protocol counters. This information will be used in the should you call Rockwell Automation Technical Support for troubleshooting.

6. Click Memory Map at the bottom of the current dialog.

The Data Table Memory Map page appears and displays a table that lists the data table files and their type and size in elements of the connected controller.

Each file contains a hyperlink that takes you to the specific Data Table Monitor dialog for that file.

7. Click DT Monitor at the bottom of the Data Table Memory Map dialog.

The Data Table Monitor page appears and displays a table that shows the contents of the selected controller's data table file.

The available and default display formats depend on the data type of the file.

8. Press Prev or Next to display the previous or next page of the data table file.

You can change the Data Table Address, Display Format, and Refresh data every fields by entering the data in the text boxes and clicking the Change Parameters button.

To change the refresh data function back to the default of 15 seconds, click the Default field. To disable the refresh data function, click the Disable button.

Generate Web User-provided Pages

You can use a text editor to generate up to 16 Web user-provided pages. The pages are stored in consecutive ASCII files of the controller. The channel-configuration feature of RSLogix 5 software, version 5.20 or later, lets you select the starting file and number of files used.

The software also lets you import your user file from your personal computer to a specified ASCII file in the controller.

Reference Other Pages/Servers

These are some basic considerations when referencing other pages or servers:

- Reference User-specified pages in the controller by using the names **user1.html** through **user 16.html**. To reference a page on the same controller, specify a URL such as **/user2.html**
- Reference a page on another controller by specifying a URL such as **http://iota4/user2/html**.
- Reference other Web servers and display images from other sources without affecting your usage of data table memory (except for the size of the HTTP reference).

Reference Data Table Memory

Reference data table memory locations by placing custom tags into your HTML source that specify the data table location and optional formatting information. Use the following format for the custom tag:

```
<!ABDTR-file_type{file_number}:{file_element}{,#elements}{%format}>
```

The items surrounded by {} are sometimes optional. Items surrounded by [] are always optional.

You must always specify the basic file reference. Depending on which file is being referenced, **file_number** or **file_element** may be defaulted. If the **file_type** is I, O, or S, the **file_number** does not need to be specified, but the **file_element** must be specified. If the **file_type** is not one of the three special files, the **file_number** must be specified and the **file_element** may default to zero (the input, output, and status files have fixed numbers).

Other considerations include:

- **#elements** - if not specified, this defaults to one. If less than one, also defaults to one. Each element gets output using the same format (whether specified with %format or defaulted).

- **%format** - legal values are %d for decimal and %x for hexadecimal. The following file types allow the format to be specified:

• Input	• Integer	• MSG	• BCD
• Output	• Timer	• BT	• PID
• Status	• Counter	• Control	• SFC
- **Display format defaults** - Input and Output file elements are output in octal format. Status and BCD file elements are output in hexadecimal format with a leading 0x. Integer file elements are output in decimal format. Complex data types (Timer, Counter, MSG, BT, Control, PID, and SCF) are output as a table with bits and important words specified.
- **Fixed display formats** - float files are always output in floating-point format ("C"%g format). ASCII and string files are always output as a null-terminated text string. Binary files are always output as two binary bytes.

HTML Examples

The following examples show an HTML code segment in **bold** with a short description of what you would see on a Web browser:

The input image word is I:0 is **<!ABDTR-I:0>**.

This segment displays the value of the first word of the input image table in the default format of octal with bold type.

The time values in T4:0 are **<!ABDTR-T4:0>**.

This segment will display the values of the timer in T4:0 in the default format of a table.

I:0 is **<!ABDTR-I:0%d>**.

This segment displays the value of the first word of the input image table in decimal with bold type.

T4:0 is **<!ABDTR-T4:0%d>**.

This segment displays the values of the three words comprising timer T4:0 in decimal with bold type.

N24:0 to n24:3 are **<!ABDTR-N24:0,4>**.

This segment displays the values of the four words in N24:0 through N24:3 in decimal with bold type.

S:21-S:23 are **<!ABDTR-S:21, 3%d>**.

This segment displays the values of the three words in S:21 through S:23 in decimal with bold type.

Generate Custom Data Table Monitor Pages

You can generate Custom Data Table Monitor pages with your text editor then download them to the controller. The first element of the file must contain a special tag as follows:

```
<!ABCDM-xx>
```

where **xx** is the automatic refresh rate in seconds (01...99). A value outside the range defaults to a snapshot display.

You can modify the refresh rate three ways:

- Enter the desired refresh rate and press Change
- Press Default for a 15 second refresh
- Press Disable to disable the refresh

Reference Data Table Memory

The Data Table locations in the Custom Data Table Monitor are referenced by placing custom tags into the ASCII file of the controller. The format of the custom tag is:

```
<!ABDTRfile_type{file_number};{file_element}[,#elements][%format][#expand][!comment]>
```

The items surrounded with {} are sometimes optional. Items surrounded by [] are always optional.

You must always specify the basic file reference. Depending on which file is being referenced, **file_number** or **file_element** may be defaulted. If the **file_type** is I, O, or S, the **file_number** does not need to be specified, but the **file_element** must be specified. If the **file_type** is not one of the three special files, the **file_number** must be specified and the **file_element** may default to zero (because the input, output, and status files have fixed numbers).

Other considerations include:

- **#elements** - if not specified, this defaults to one. If less than one, also defaults to one. Each element gets output using the same format (whether specified with %format or defaulted). Any associated comment is displayed only for the first element.
- **%format** - legal values are %b for binary, %d for decimal and, 0% for octal and %x for hexadecimal. The following file types allow the format to be specified:
 - Input
 - Output
 - Status
 - Integer
 - BCD

All other file types are displayed in an appropriate format. If a % format modifier is present, the format may be changed by clicking on the file type/number via a Web browser.

- **#expand** - legal values are #c and #e. This modifier determines whether the structure file types are displayed in their expanded or compacted formats. If a # modifier is present, the format may be changed by clicking on the [+] / [-] via a Web browser. If a #modifier is not present, the default display of expanded will not be used.
- **!comment** - data after the exclamation point and up to the closing > will be displayed in the Comment column of the monitor.
- **Fixed display formats** - float files are always output in floating-point format ("C"%g format). String files are always output as a null-terminated text string. Binary files are always output as two binary bytes. ASCII files are displayed in a memory dump format.

Import User Page Files to the Controller

Use RSLogix5 software to import user page files to the controller's ASCII files:

1. Right-click the ASCII file where you will import the user page file in the Project folder (under the Data Files folder).
2. Click Properties.
3. Click Import HTML.
4. Use the browser to locate the user page file you want to import.
5. Double-click the file to select it.
6. Click OK.
7. Repeat this process for each user page file.
8. Go online with your controller when all user page files have been imported.
9. Select the User Provided Pages link to view the User Provided Pages menu.
10. Click User Provided Page # to display that specific page.
11. Click the link under the file heading to display an ASCII dump of the ASCII file.
12. Select User Provided Page #4.

13. Click +A22.

You can change the radix display of N7:0 through N7:2.

14. Go back to the Custom Data Table Monitor page.
15. Click N:70 in the Address column to display the radix selection page.
16. Click the desired radix type radio button.

Follow these directions to see the Sample Extended Format page:

1. Go back to the Custom Data Table Monitor page.
2. Click + before the T4:0 in the Address column to display the Sample Extended Format.

SNMP MIB II Data Groups

Simple Network Management Protocol (SNMP) specifies the diagnostic data that a host computer must maintain for a network management software to access. Hosts typically keep:

- statistics on the status of their network interfaces.
- incoming and outgoing traffic.
- dropped datagrams.
- error messages.

Network management protocols let network management software access these statistics.

Management Information Base II is the SNMP standard for the management of network data. The following tables list the MIB II data items and their descriptions.

MIB Data and Descriptions

Group	MIB	Description
System	sysDescr	Description of device
	sysObjectID	Identity of agent software
	sysUpTime	How long ago the agent started
	sysName	Device name
	sysServices	Services offered by the device

Group	MIB	Description
Interfaces	ifIndex	Interface number
	ifDescr	Description of the interface
	ifType	Type of interface
	ifMTU	MTU size
	ifSpeed	Transmission rate in bits/second
	ifPhysAddress	Media specific address
	ifAdminStatus	Desired interface state
	ifOperStatus	Current interface state
	ifLastChange	How long ago interface changes state
	ifInOctets	Total octets received from the data
	ifUcasPackets	Broadcast/multicast packets delivered above
	ifInDiscards	Packets discarded due to resource limitations
	ifInErrors	Packets discarded due to format
	ifUnknownProtos	Packets destined for unknown protocols
Interfaces	ifOutOctets	Total octets sent on the media
	ifOutOcastPkts	Unicast packets from above
	ifOutNUcastPkts	Broadcast/multicast packets from above
	ifOutDiscards	Packets discarded due to resource limitations
	ifOutErrors	Packets discarded due to errors
	ifOutQlen	Packet size of output queue
	ifSpecific	MIB-specific pointer
UDP	udpIndataGrams	Datagrams delivered above
	udpNoPorts	Datagrams destined for unknown ports
	udpInErrors	Datagrams discarded due to format errors
	udpOutDatagrams	Datagrams sent from above
	udpLocalAddress	Local IP address
	udpLocalPort	Local UDP port

Group	MIB	Description
IP	ipForwarding	Acting as a gateway or host
	ipDefaultTTL	Default TTL for IP packets
	ipInReceives	Total datagrams from below
	ipInHdrErrors	Datagrams discarded due to format errors
	ipInAddrErrors	Datagrams discarded due to misdelivery
	ipForwDatagrams	Datagrams forwarded
	ipUnknownProtos	Datagrams destined for unknown protocols
	ipInDiscards	Datagrams discarded due to resource limitations
	ipInDelivers	Datagrams delivered above
	ipOutRequests	Datagrams from above
	ipOutNoRoutes	Datagrams discarded due to no route
	ipReasmTimeout	Timeout value for reassembly queue
	ipRouteDest	Destination IP address
	ipRouteIfIndex	Interface number
	ipRouteMetric1	Routing metric number 1
	ipRouteMetric2	Routing metric number 2
	ipRouteMetric3	Routing metric number 3
	ipRouteMetric4	Routing metric number 4
	ipRouteNextHop	Next hop (gateway IP address for indirect routing)
	ipRouteType	Type (direct, remote, valid, invalid)

Group	MIB	Description
IP	ipRouteProto	Mechanism used to determine route
	ipRouteAge	Age of route in seconds
	ipRouteMask	Subnet mask for route
	ipNetToMediaIfIndex	Interface number
	ipNetToMediaPhysAddresses	Media address of mapping
	ipNetToMediaNetAddresses	IP address of mapping
	ipNetToMediaType	How mapping was determined
	ipReasmReqds	Fragments received needing reassembly
	ipReasmOKs	Datagrams successfully reassembled
	ipReasmFails	Reassembly failure
	ipFragOKs	Datagrams successfully fragmented
	ipFragCreates	Fragments created
	ipAdEntAddr	The IP address of this entry
	ipAdEntIfIndex	Interface number
	ipAdEntNetMask	Subnet mask for IP address
	ipAdEntBcastAddr	LSB of IP broadcast address
	ipAdEntReasMaxSize	The largest IP datagram able to be reassembled
ICMP	26 counters	Two counters for each ICMP message type
TCP	tcpRtoAlgorithm	Identifies retransmission algorithm
	tcpRtoMin	Minimum retransmission timeout in ms
	tcpRtoMax	Maximum retransmission timeout in ms
	tcpmaxConn	Maximum of simultaneous TCP connections allowed
	tcpActiveOpens	Number of active opens
	tcpPassiveOpens	Number of passive opens
	tcpAttemptFails	Number of failed connection attempts
	tcpEstabResets	Number of connections reset
	tcpCurrEstab	Number of current connections

Group	MIB	Description
TCP	tcpInSegs	Number of segments received
	tcpOutSegs	Number of segments sent
	tcpRetransSegs	Number of segments retransmitted
	tcpInErrors	Number of segments discarded due to format errors
	tcpOutRsts	Number of resets generated
	tcpConnState	State of connection
	tcpConnLocalAddress	Local IP address
	tcpConnLocalPort	Local TCP port
	tcpConnRemAddress	Remote IP address
	tcpConnRemPort	Remote TCP port

Interpret the LED Indicators

If your module is operating correctly, you see:

- Status LED indicator remains lit green
- Ethernet Transmit LEDs briefly light green when transmitting packets

If the LED indicators do not indicate the above normal operation, refer to the following table.

LED Indicator Descriptions

Indicator	Color	Description	Probable Cause	Recommended Action
STAT	Solid red	Critical hardware fault.	Module requires internal repair.	Contact your local Allen-Bradley distributor.
	Blinking red	Hardware or software fault (detected and reported via a code).	Fault-code dependent.	Refer to module error codes.
	Off	Module is functioning properly but it is not attached to an active Ethernet network.	Normal operation.	Attach the controller and interface module to an active Ethernet network.
	Green	Ethernet channel 3A is functioning properly and has detected that it is connected to an active Ethernet network.	Normal operation.	No action required.
100M or 10M	Green	Lights (green) briefly when the Ethernet port is transmitting a packet. It does not indicate whether or not the Ethernet port is receiving a packet.		

Monitor the series of blinks to determine the fault code. Count the first and last series of slow blinks, and disregard the series of fast blinks between the slow series.

IMPORTANT

The interface module will flash the indicator lights as shown in the Module Error Codes table. The controller may fault even though the module does not.

Module Error Codes

Code	Description	Code	Description
01	General 68000 test failure	36	PLC-5 dual-port initialization failure
02	Bus error	37	PLC-5 not compatible with 1785-ENET
03	Address error	38	Dual-port diagnostic failure
04	Illegal instruction	41	Could not read FLASH id
05	Divide by zero	42	Could not erase FLASH bank
06	Reserved	43	Could not program FLASH bank
07	Reserved	51	Software initialization failure
08	Privileged instruction	52	ENET firmware hardware fault
09	Trace trap	53	ENET software failure
10	Line 1010 instruction	54	Network system failure
11	Line 1111 instruction	55	Dual-port system failure
12	Hardware breakpoint	56	Dual-port internal inconsistency
13	Reserved	57	ISR system failure
14	Uninitialized interrupt	58	ISR internal inconsistency
15	Format error	61	Lump system call failed
16	Reserved	62	Lump internal inconsistency
24	Spurious interrupt	63	PCCC system call failed
25	TRAP in instruction	64	PCCC internal inconsistency
26	Unassigned user	65	Dual-port system call failed
27	Unassigned reserved	66	Dual-port internal inconsistency
31	OS area checksum not valid	71	AC power fail
32	Static RAM self-test failed	72	Reset asserted
33	Jump table wrong	73	Fault asserted
34	Ethernet chip test failed	74	Watchdog timeout
35	FLASH BOOT area checksum incorrect	75	Unknown NMI

When the status LED blinks red, it signals that a hardware or software fault has been detected and it reports the error via a code. This code is a two-digit fault code signaled by a flash sequence. First, the LED begins the sequence with 10 rapid flashes. Then the LED signals the first digit of the code by a number of slow flashes. Approximately two seconds after the LED displays the first digit, the LED displays the second digit. This sequence repeats itself until the module is either reset or replaced.

The following table lists controller fault codes relating to the interface module.

Controller Fault Codes

Fault Code	Description
91	Module undefined message type.
92	Module requesting undefined pool.
93	Module illegal maximum pool size.
94	Module illegal ASCII message.
95	Module reported fault, in which a bad program causes memory corrupt, or, of a hardware failure.
96	Module not physically connected to the controller.
97	Module requested a pool size that is too small for PCC command (occurs when cycling power).
98	Module first/last 16 bytes RAM test failed.
99	Module-to-controller data transfer faulted.
100	Controller-to-module transfer failed.
101	Module end-of-scan transfer failed.
102	The file number specified for raw data transfer through the module is an illegal value.
103	The element number specified for raw data transfer through the module is an illegal value.
104	The size of the transfer requested through the module is an illegal size.
105	The offset into the raw transfer segment of the module is an illegal value.
106	Module transfer protection violation; for PLC-5/26, PLC-5/46, and PLC-5/86 controllers only.

Specifications

Ethernet Interface Module - 1785-ENET

Attribute	Value
Backplane Current	1.0 A @ 5V dc
Power Dissipation	5 W
Heat Dissipation	17.06 BTU/hr
IEC Temp Code	T5
North American Temp Code	T5
Isolation Voltage	50V, Basic Insulation Type Tested at 500V ac for 60 s, Communications to system
Wire Type	Ethernet: 802.3 compliant shielded or unshielded twisted pair
Wiring Category ⁽¹⁾	2 - on communications ports
Communication	Ethernet (TCP/IP protocol 8-pin RJ45 port)
Weight, Approx.	0.77 kg (1.7 lb)
Dimensions (HxWxD), Approx.	273.05 x 31.75 x 146.05 mm (10.75 x 1.25 x 5.75 in.)

⁽¹⁾ Use this Conductor Category information for planning conductor routing. Refer to Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

Environmental Specifications

Attribute	Value
Operating Temperature	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): 0...60 °C (32...140 °F)
Storage Temperature	IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), IEC 60068-2-2 (Test Bc, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock): −40...85 °C (−40...185 °F)
Relative Humidity	IEC 60068-2-30 (Test Db, Unpackaged Damp Heat): 5...90% noncondensing
Vibration	IEC 60068-2-6 (Test Fc, Operating): 2 g @ 10...500 Hz
Shock, Operating	IEC 60068-2-27 (Test Ea, Unpackaged shock): 30 g
Shock, Nonoperating	IEC 60068-2-27 (Test Ea, Unpackaged shock): 50 g
Emissions	Group 1, Class A (with appropriate enclosure)
ESD Immunity	IEC 61000-4-2: 6 kV indirect contact discharges
Radiated RF Immunity	IEC 61000-4-3: 10V/M, with 1 kHz sine-wave 80% AM from 80...2000 MHz 10V/M with 200 Hz 50% Pulse 100% AM at 900 MHz 10V/M with 200 Hz 50% Pulse 100% AM at 1890 MHz
EFT/B Immunity	IEC 61000-4-4: ±2 kV at 5 kHz on shielded communications ports ±1 kV at 5 kHz on unshielded communications ports
Surge Transient Immunity	IEC 61000-4-5: ±2 kV line-earth (CM) on communications ports
Conducted RF Immunity	IEC 61000-4-6: 10V rms with 1kHz sine-wave 80% AM from 150 kHz...80 MHz
Enclosure Type Rating	None (open style)

Certifications

Certification	Value
Certifications ⁽¹⁾ (when product is marked)	UL UL Listed Industrial Control Equipment. See UL File E65584. CSA CSA Certified Process Control Equipment. See CSA File R54689C. CSA CSA Certified Process Control Equipment for Class I, Division 2 Group A,B,C,D Hazardous Locations. See CSA File LR69960C. CE European Union 89/336/EEC EMC Directive, compliant with: EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions C-Tick Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions EEx European Union 94/9/EC ATEX Directive, compliant with: EN 60079-15; Potentially Explosive Atmospheres, Protection "n" (Zone 2) EtherNet/IP ODVA conformance tested to EtherNet/IP specifications

⁽¹⁾ See the Product Certification link at <http://www.ab.com> for Declarations of Conformity, Certificates, and other certification details.

Additional Resources

Title	Publication
PLC-5 Ethernet Interface Module User Manual, Series A and Series B	1785-6.5.19
Enhanced and Ethernet PLC-5 Programmable Controllers User Manual	1785-UM012
ControlNet PLC-5 Controllers User Manual	1785-UM022

You can view or download publications at <http://literature.rockwellautomation.com>.

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For an additional level of technical phone support for installation, configuration and troubleshooting, we offer TechConnect Support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit <http://support.rockwellautomation.com>.

Installation Assistance

If you experience a problem with a hardware module within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your module up and running:

United States	1.440.646.3223 Monday – Friday, 8am – 5pm EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

New Product Satisfaction Return

Rockwell tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned:

United States	Contact your distributor. You must provide a Customer Support case number (see phone number above to obtain one) to your distributor in order to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for return procedure.

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